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ALIGNMENTS

protein. B.thuringiensis CryIIIC insecticidal corn rootworm toxicity AAR14047 standard; protein; 652 (revised)
(first entry) Bacillus thuringiensis 25-MAR-2003 07-JAN-1992 WO9114778-A AAR14047; AAR14047 RESULT 1

480 480

481

360

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120 120

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The cryIIIC gene was isolated from a B.thuringiensis strain EG4961 library in pUC18. Screening was by a cryIIIB gene probe. One positive colony was subcloned and sequenced. It contained an B.3kb fragment whose ORF was deduced to encode a protein of mol. wt. 74393 Daltons. The monared protein Gesignated CryIIIC) has enhanced corn rootworm toxicity compared to known proteins CryIIIA and CryIIIB. The following amino acid residues to known proteins CryIIIA and CryIIIB. The following amino acid residues are thought to be significant for this toxicity; His9, His99, His231, Gh1339, photein can be used in an insecticide composition. Insecticidal activity can be enhanced by addition of CryI to the composition. (Updated on 25-MARR-2003 to correct PI field.)
                                                                                                                                                                                                                                                                                                                                                                                                                 - encoding protein with toxicity
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                                                                          Hohnson TB
                                                                                                              New bacillus thuringiensis crylllC gene
to Coleoptera inserfe
                                                                            Slaney AC,
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Best Local Similarity 100.
Matches 652; Conservative
                                                                             Donovan WP, Rupar MJ,
                                                                                              WPI; 1991-310578/42.
N-PSDB; AAQ14098.
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  LFLKESSNSIAKFKVTLNSAALLQRYRVRIRYASTTNLRLFVQNSNNDFLVIYINKTMNK
                              LFLKESSNSIAKFKVTLNSAALLQRYRVRIRYASTTNLRLFVQNSNNDFLVIYINKTMNK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  mutant; insecticidal activity; insecticidal specificity;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        coleoptera; southern corn rootworm; western corn root worm; Diabrotica undecimpunctata howard; Barber; transgenic plant; Diabrotica virgifera vergifera LeConte; insecticide resistance.
                                                                                                                                DDDLTYQTFDLATTNSNMGFSGDKNELIIGAESFVSNEKIYIDKIEFIPVQL
                                                                                                  DDDLTYQTFDLATTNSNMGFSGDKNELIIGABSFVSNEKIYIDKIEFIPVQL
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Kulesza CA;
                                                                                                                                                                                                                                                                                                                                                                                                                                               Amino acid sequence of the wild type cry3Bb protein.
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Von Tersch MA,
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                                                                                                                                                                                                                                                                                      AAY23207 standard; protein; 652
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97US-00993722.
97US-00993775.
97US-00996441.
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Slatin SL,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Bacillus thuringiensis.
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MONSANTO CO
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18-DEC-1997;
18-DEC-1997;
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                                                         61 TVKDAVGTGISVVGQILGVVGVPFAGALTSFYQSFLNTIWPSDADPWKAFMAQVEVLIDK
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                                                                                                                                                                                                                                     The present sequence represents the Cry3BB protein. The specification describes new Bacillus thuringiensis Cry3BB mutant proteins, and provides methods for producing them. The B. thuringiensis Cry3BD polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or delection cours at a position corresponding to from about substitution or deletion occurs at a position corresponding to from about modified polypeptide sequence (AAY22207 capresents the wild type Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn root voctworm and western corn root worm, (Diabrotica undecimpunctate howardi Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cry3Bb chick of the content of th
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                                          Kulesza CA;
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                                        Bryson JW,
A, Romano (
                                                                                                                                                         Insecticidal Bacillus thuringiensis proteins
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                                                                                                                                                                                                      Disclosure, Page 500-502; 512pp; English
                                                                  Von Tersch MA,
                                            Malvar TM,
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Matches 652; Conservative
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                                          Brussock SM
Slatin SL,
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                                                                                                               WPI; 1999-395184/33
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Walters FS,
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                                                                                                                                                                                                                                                                                                                                                                                              delta-endotoxin, Cry3B; Cry3Bb1; Bt toxin; crystal protein; insect pest; insecticide; Coleopteran; expression cassette; transgenic plant.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         The present sequence is a Bacillus thuringiensis delta-endotoxin, Cry3Bb which is toxic to Coleopteran insect pests. The coding sequence of this protein is used in an expression cassette which provides improved expression of Cry3B or Cry3B variant proteins in transgenic plants e.g. maize. Transgenic plants expressing higher levels of Cry3B proteins exhibit increased insecticidal activity against Coleopteran pests
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ive 0; Mismatches 0;
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                                                                                                                                                                                                          CrylBb1; delta-endotoxin; plant; transgenic; insecticide; Cryl; Coleopteran insect infestation; increased toxicity; season long protection; beetle.
                                                                                                                                                                                                                                                                                                                               Bacillus thuringiensis delta endotoxin Cry3Bbl
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from the transformed maize plant cell. A transgenic plant expressing the modified polynucleotide is useful for controlling Coleopteran insect infestation in a field of croop plants. The modified polynucleotide is useful for producing transgenic plants expressing higher levels of the insect controlling B. thuringiensis delta-endotoxin. The modified copolynucleotide provides up to 10 fold higher levels of finsect controlling C delta-endotoxin relative to the highest levels obtained using prior compositions. In particular, transgenic maize expressing higher levels of the CYSBB protein designed to exhibit increased toxicity toward coleopteran pests deliver superior levels of insect protection and are coleopteran pests deliver superior levels of insect protection and are coleopteran pests deliver superior levels of insect protection and are consistent to the insecticidally active protection. Improved control of susceptible target insect pests and season long protection from insect pathogens is achieved using the modified polynucleotide. The modified compositions reduces the number of transgenic events that have to be screened in order to identify one which contains beneficial levels of one or more insect controlling compositions. The present sequence represents the amino acid sequence of Bacillus thuringiensis delta endotoxin Cry3Bbl
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ch 100.0%; Score 3406; DB 6; al Similarity 100.0%; Pred. No. 7.4e-277; 652; Conservative 0; Mismatches 0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Sequence 652 AA;
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Matches 65
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ABW01050 standard; protein; 652

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This sequence represents a delta-endotoxin crystal protein. This protein was included in the scope of the invention as a comparison to the delta-endotoxin of the invention. Some of the delta-endotoxin coding sequences of the invention have alternative start codons, producing more than one protein from a single open reading frame. The nucleic acid sequences of the invention are useful in DNA constructs or expression cassettes for transformation and expression in plants and bacteria. The nucleic acids and corresponding polypeptides are useful for killing lepidopteran or coleopteran pests. Compositions containing the delta-endotoxins of the
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          New isolated delta-endotoxin and delta-endotoxin-associated nucleic acids and polypeptides, useful for killing lepidopteran or coleopteran pests or for producing organisms with pesticide resistance.
LFLKESSNSIAKFKVTLNSAALLQRYRVRIRYASTTNLRLFVQNSNNDFLVIYINKTMNK
                                                     CFLMQDRRGTIPFFTWTHRSVDFFNTIDAEKITQLPVVKAYALSSGASIIEGPGFTGGNL
                                                                                                                                                                                                                                                                                                                                                                                                                                               delta-endotoxin; delta-endotoxin associate polypeptide;
sypression cassette; transformation; transgenic; plant; bacteria;
lepidoptera; coleoptera; pest; pesticide; resistance;
pesticidal activity.
                                                                                                                                                                                                         DDDLIYQTFDLATTNSNMGFSGDKNELIIGAESFVSNEKIYIDKIBFIPVQL 652
                                                                                                                                                                                         DDDLTYQTFDLATTNSNMGFSGDKNELIIGAESFVSNEKIYIDKIEFIPVQL
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                                                                                                                                                                                                                                                                                                              ADR89425 standard; protein; 652
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2004US-00782020.
2004US-00782096.
2004US-00782141.
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2003US-0448810P.
2003US-0448812P.
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2003US-0448797P.
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Bacillus thuringiensis
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19-FEB-2004;
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         The invention relates to novel transgenic plants comprising Bacillus thuringiensis Cry3-delta-endotoxin gene or its variants having coleopteran inhibitory activity. The invention is useful for controlling coleopteran insect infestation in a field of crop plants. The present sequence is B. thuringiensis Cry3Bbl-delta- endotoxin protein
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                      New transgenic plant resistant to Coleopteran pests, comprises Bacillus
                                                                                                                          Transgenic plant; Cry3Bb1-delta-endotoxin; Coleopteran pest resistance;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   SMPSFAVSKFEVLFLPTYAQAANTHLLLLKDAQVFGEEWGYSSEDVAEFYHRQLKLTQQY
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                                                                                              Bacillus thuringiensis Cry3Bbl-delta-endotoxin protein.
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         thuringiensis Cry3-delta-endotoxin gene
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          5; Page 28-29; Opp; English
                                                                                                                                                                                                                                                                                  29-AUG-2002; 2002US-00232665
                                                                                                                                                                                                                                                                                                                    99US-00377466
                                                            (first entry)
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Best Local Similarity 100.
Matches 652; Conservative
                                                                                                                                                                              Bacillus thuringiensis
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         production of organisms with pesticide resistance, specifically bacteria and plants. These organisms are useful for generating altered or improved delta-endotoxin or delta-endotoxin-associated proteins that have pesticidal activity, or for detecting the presence of delta-endotoxin or delta-endotoxin-associated proteins or nucleic acids in products or
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 production, are useful for the
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                                                                                                                 Length
                                                                                                                                      Indela
                                                                                                               Query Match 100.0%; Score 3406; DB 8; Best Local Similarity 100.0%; Pred. No. 7.4e-277; Matches 652; Conservative 0; Mismatches 0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Amino acid sequence of Cry3Bb.11095 polypeptide.
 and methods for their
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                                                                                          Sequence 652 AA;
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Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The condition in the primary sequence of the native or unmodified Cry3Bb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmodified Cry3Bb protein). The polypeptide sequence (AAX232O) represents the wild type Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cry3Bb polynucleotides can also be used to produce transgenic plants with increased insecticide resistance
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                            Bacillus thuringiensis.
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MONSANTO CO
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              mutant; insecticidal activity; insecticidal specificity;
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Von Tersch
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Bacillus thuringiensis.
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                                                                                                                                              Length 652;
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99.9%; Score 3401; DB 2;
Best Local Similarity 99.8%; Pred. No. 1.9e-276;
Matches 651; Conservative 0; Mismatches 1;
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652 652

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The invention relates to a modified polynucleotide which encodes an insecticidal crystal 3 (Cry3) Bacillus thuringlensis delta-endotoxin such as ar Crybb. The modified polynucleotide is useful for producing a cransformed cell, by introducing the modified polynucleotide into a cell cuch as a plant cell (preferably a maize cell) or a microbial cell. The modified polynucleotide into a maize plant cell. The configuration of maize plant cell and regenerating a maize plant cell. By introducing the modified polynucleotide into a maize plant cell. The modified polynucleotide is useful for controlling Coleopteran insect infestation in a field of crop plants. The modified polynucleotide is useful for producing transgenic plants expressing higher levels of the infestations in a field of crop plants. The modified polynucleotide is useful for producing transgenic plants expressing higher levels of the insect controlling b. thuringiensis delta-endotoxin. The modified polynucleotide provides up to 10 fold higher levels of insect controlling compositions in particular, transgenic maize expressing higher levels of the Cry3Bb protein designed to exhibit increased toxicity toward compositions in particular, transgenic maize expressing higher levels of the Cry3Bb protein designed to exhibit increased toxicity toward compositions in particular, propersor levels of insect protection and are less likely to sponsor development of populations of target insects that are resistant to the insecticidally active protein. Improved control of are resistant to the insect perses and season long protection from insect pathogens is achieved using the modified polynucleotide reduces the number of transgenic events that have to be exceened in order to identify one which contents that have to be greened in order to identify one which contents that have to be exceened in order to identify one which contents are remained to the contents of transgenic secures of the contents of the present of the contents of the contents of the contents of the contents
                           541 LFLKESSNSIAKFKVTLNSAALLQRYRVRIRYASTTNLRLFVQNSNNDFLVIYINKTMNK 600
                                                                                                                                                                                                                                                                                                                                                                                                                                                       Cry3Bb; delta-endotoxin; plant; transgenic; insecticide; crystal 3; Cry3; Coleopteran insect infestation; increased toxicity; season long protection; beetle.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                more insect controlling compositions. The present sequence represents
LFLKESSNSIAKFKVTLNSAALLQRYRVRIRYASTTNLRLFVQNSNNDFLVIYINKTMVK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            New modified polynucleotide useful for controlling Coleopteran insectinfestation in a field of crop plants encodes insecticidal crystal 3 Bacillus thuringiensis delta-endotoxin.
                                                                                       Bacillus thuringiensis delta endotoxin Cry3Bb.
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                                                                                                                                                                                                                                                             ABU09194 standard; protein; 652
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                                                                                                                                                                                                                                                                                                                                                               (first entry)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      Bacillus thuringiensis.
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Synthetic.
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                                                                                                                                                                                                                RESULT 11
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      The present sequence is a synthetic delta-endotoxin, Cry3Bb which is essentially homologous to the native protein from Bacillus thuringiensis. The protein is toxic to Coleopteran insect pests. The corresponding gene was used to create cry3Bb variant AAV11231 for use in an expression cassette which provides improved expression of Cry3B or Cry3B variant proteins in transgenic plants e.g. maize. Transgenic plants expressing higher levels of Cry3B proteins exhibit increased insecticidal activity against Coleopteran pests
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         SMPSFAVSKFEVLFLPTYAQAANTHLLLLKDAQVFGEEWGYSSEDVAEFYHRQLKLTQQY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          TDHCVNWYNVGLNGLRGSTYDAWVKFNRFRREMTLTVLDLIVLFPFYDIRLYSKGVKTEL
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                                                                                                                                                                                                                                                                                                                                                          Novel expression cassettes which express Bacillus thuringiensis Cry3 delta-endotoxin portion which is toxic to coleopteran insect pests, useful for producing transgenic plants with improved insecticidal
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Pred. No. 1.9e-276;
0; Mismatches 1;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Example 2; Page 101-103; 171pp; English
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est Local Similarity 99.8
erches 651; Conservative
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WO200011185-A2
                                                                                            19-AUG-1999;
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                                                                                                                                                                                                                                         Romano CP;
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Bacillus thuringiensis delta endotoxin Cry3Bb
                                                                                MNPNNRSEHDTIKVTPNSELQTNHNQYPLADNPNSTLEELNYKEFLRMTEDSSTEVLDNS
                                                                                                                                                  KIEEYAKSKALAELQGLQNNFEDYVNALNSWKKTPLSLRSKRSQDRIRELFSQAESHFRN
                                                                                                                                                                                                                      TDHCVNWYNVGLNGLRGSTYDAWVKFNRFRREMTLITVLDLIVLFPFYDIRLYSKGVKTEL
                                                                                                                                                                                                                                              TRDIFTDPIFSLNTLQEYGPTFLSIENSIRKPHLFDYLQGIEFHTRLQPGYFGKDSFNYW
                                                                                                                                                                                                                                                            TRDIFTDPIFSLNTLQEYGPTFLSIENSIRKPHLFDYLQGIBFHTRLQPGYFGKDSFNYW
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                                                                                                                                                                                                                                                                                                                                                                                                  Transgenic plant, Cry3Bb-delta-endotoxin, Coleopteran pest resistance;
insecticide.
                                                                                                                                        KIEEYAKSKALAELQGLQNNFEDYVNALNSWKKTPLSLRSKRSQDRIRELFSQAESHFRN
                                                                                                                                                                           SMPSFAVSKFEVLFLPTYAQAANTHLLLLKDAQVFGEEWGYSSEDVAEFYHRQLKLTQQY
                                                                                                                                                                                     SMPSFAVSKPEVLFLPTYAQAANTHLILLKDAQVPGEEWGYSSEDVAEFYHRQLKLTQQY
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                                                                    MNPNNRSEHDTIKVTPNSELQTNHNQYPLADNPNSTLEELNYKEFLRMTEDSSTEVLDNS
                                                                                                                                                                                                                                                                                                                                                     CFLMQDRRGTIPFFTWTHRSVDFFNTIDAEKITQLPVVKAYALSSGASIIEGPGFTGGNL
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                                 Score 3401; DB 6;
Pred. No. 1.9e-276;
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                                 99.98;
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the amino acid sequence of
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                                                   651; Conservative
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                                Query Match
Best Local Similarity
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                 Sequence 652 AA
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                                                                                                                                                                                                                                 The invention relates to novel transgenic plants comprising Bacillus thuringiansis Cry3-delta-endotoxin gene or its variants having coleopteran inhibitory activity. The invention is useful for controlling Coleopteran insect infestation in a field of crop plants. The present sequence is B. thuringiensis Cry3Bb-delta- endotoxin protein
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                                                                                      comprises Bacillus
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                                                                                      New transgenic plant resistant to Coleopteran pests,
thuringiensis Cry3-delta-endotoxin gene,
                                                                                                                                                                            Disclosure; Page 36-38; Opp; English.
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Matches 651; Conservative
2003-810928/76
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Von Tersch MA,
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97US-00993722.
97US-00993775.
97US-00996441.
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Slatin SL,
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Bacillus thuringiensis.
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MONSANTO CO.
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18-DEC-1997;
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18-DEC-1997;
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                                                                                                                             mutant; insecticidal activity; insecticidal specificity;
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                                                                                                                                          coleoptera, southern corn rootworm; western corn root worm;
Diabrotica undecimpunctata howardi Barber; transgenic plant;
Diabrotica virgifera vergifera LeConte; insecticide resistance
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Pred. No. 2.4e-276;
1; Mismatches 1;
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Von Tersch MA, Romano
                                                                                                Amino acid sequence of Cry3Bb.11036 polypeptide.
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                standard; protein; 652 AA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  Claim 39; Page 401-403; 512pp;
                                                                                                                                                                                                                                                                                                                                97US-00993170.
97US-00993722.
97US-00993775.
97US-00996441.
                                                                                                                                                                                                                                                                                                      98WO-US026852
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                                                                     (first entry)
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                                                                                                                                                                                                                 Bacillus thuringiensis.
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                                                                                                                                                                                                                                                                                                                                                                                                       (ECOG-) ECOGEN INC. (MONS ) MONSANTO CO.
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Best Local Similarity
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18-DEC-1997;
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                                                                                                                           Cry3Bb;
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AAY23193 standard; protein; 652

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Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb coppeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified Cry3Bb colypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmodified Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootword mand western corn root worm, (Diabrotica undecimpunctata cour torsy3Bb polymucleotides can also be used to produce transgenic plants with increased insecticide resistance
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                                              AAY23172-Y23206, and AAX23208-X23209 represent new Bacillus thuringiensis
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Pred. No. 2.4e-276;
0; Mismatches 1;
39; Page 356-358; 512pp; English
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Best Local Similarity 99.8
Matches 651; Conservative
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Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified Cry3Bb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmodified Gry3Bb polypeptide sequence (AAV23207 represents the wild type Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cry3Bb polymucleotides can also be used to produce transgenic plants with increased insecticide resistance
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                                                                                                                              mutant; insecticidal activity; insecticidal specificity;
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                                                                                                                                              coleoptera, southern corn rootworm, western corn root worm, Diabrotica undecimpunctata howardi Barber, transgenic plant, Diabrotica virgifera vergifera LeConte, insecticide resistance.
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Von Tersch MA, Romano C;
                                                                                             Amino acid sequence of Cry3Bb.11032 polypeptide
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   Insecticidal Bacillus thuringiensis proteins
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    Claim 39; Page 390-392; 512pp; English.
                                                                                                                                                                                                                                                                                                                                                                               97US-00993722.
97US-00993775.
97US-00996441.
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Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified Cry3Bb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmodified Cry3Bb polypeptide sequence (AAY232OT represents the wild type Cry3Bb protein). The polypeptide can be used to kill coleopteran peets, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cry3Bb polymuclecides can also be used to produce transgenic plants with increased insecticide resistance
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                                                                                                                                                                                                                                                                                                                                           Length 652;
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39.8%; Score 3399; DB 2;
al Similarity 99.8%; Pred. No. 2.9e-276;
651; Conservative 0; Mismatches 1;
Page 418-420; 512pp; English.
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Matches 651; Conser
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                              SMPSFAVSKFEVLFLPTYAQAANTHLLLLKDAQVFGEEWGYSSEDVAEFYHRQLKLTQQY
                                                                                               TDHCVNWYNVGLNGLRGSTYDAWVKFNRFRREMTLTVLDLIVLFPFYDIRLYSKGVKTEL
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Von Tersch MA,
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97US-00993722.
97US-00993775.
97US-00996441.
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Slatin SL,
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MONSANTO CO.
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18-DEC-1997;
18-DEC-1997;
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sequence of Cry3Bb.11224 polypeptide.
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97US-00993722.
97US-00993775.
97US-00996441.
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               (first entry)
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Best Local Similarity 99.8'
Matches 651; Conservative
                                                                                                                                                        SM,
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Slatin SL,
                                                              Synthetic.
Bacillus thuringiensis.
                                                                                                                                        ECOGEN INC.
MONSANTO CO
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18-DEC-1997;
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Diabrotica undecimpunctata howardi Barber; transgenic plant;
Diabrotica virgifera vergifera LeConte; insecticide resistance.
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Von Tersch MA,
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97US-00993722.
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Bacillus thuringiensis.
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Cry3Bb mutant proteins. The specification also describes methods of
altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb
polypeptide was modified to have improved insecticidal activity or
enhanced insecticidal specificity against target insect. The
condition comprises at least one amino acid substitution, addition, or
deletion in the primary sequence of the native or unmodified Cry3Bb
polypeptide sequence (AAY23207 represents the wild type Cry3Bb protein).

Corresponding to from about amino acids 1-365 of the unmodified
corresponding to the environment. It is especially useful against southern
corresponding may weath root worm, (Diabrotica undecimpunctara
corresponding to the environment of worm, (Diabrotica undecimpunctara
corresponding to the modification to the environment are supercially useful against southern
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corn rootworm and biabrotica virgifera econter respectively).
The mutant cry3Bb polynucleotides can also be used to produce transgenic
plants with increased insecticide resistance
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                                                                                                            Cry3Bb; mutant; insecticidal activity; insecticidal specificity;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ö
                                                                                                                             colooptera, southern corn rootworm, western corn root worm, Diabrotica undecimpunctata howardi Barber, transgenic plant, Diabrotica virgifera vergifera LeConte, insecticide resistance.
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Von Tersch MA, Romano C;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Score 3398; DB 2;
Pred. No. 3.5e-276;
0; Mismatches 1;
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specificity,

Cry3Bb; mutant; insecticidal activity; insecticidal specificity coleoptera; southern corn rootworm; western corn root worm; Diabrotica undecimpunctata howard! Barber; transgenic plant; Diabrotica virgifera vergifera LeConte; insecticide resistance.

Bacillus thuringiensis

Synthetic.

WO9931248-A1

24-JUN-1999

Amino acid sequence of Cry3Bb.11242 polypeptide.

(first entry)

24-AUG-1999

AAY23192;

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Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The Bb. thuringiensis Cry3Bb polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified cry3Bb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmodified cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata corn rootworm and Diabrotica virgifera leConte respectively). The mutant cry3Bb polynucleotides can also be used to produce transgenic plants with increased insecticide resistance
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Pred. No. 3.5e-276;
1; Mismatches 1;
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Best Local Similarity 99.7
Matches 650; Conservative
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Malvar TM, Bryson JW, Von Tersch MA, Romano C;

SM,

Brussock SM, Slatin SL,

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WPI; 1999-395184/33

ECOGEN INC. MONSANTO CO.

ECOG-) (SNOW English WalterB

97US-00993170. 97US-00993722. 97US-00993775. 97US-00996441.

18-DEC-1997

98WO-US026852

17-DEC-1998; 18-DEC-1997; 18-DEC-1997; 18-DEC-1997;

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AAY23172-Y23206, and AAX23208-X23209 represent new Bacillus thuringiensis

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enhanced insecticidal specificity against a target insect. The

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colypeptide, wherein the substitution or deletion occurs at a position

corresponding to from about amino acids 1-365 of the unmodified

corresponding to from about amino acids 1-365 of the unmodified

polypeptide sequence (AAY23207 represents the wild type Cry3Bb protein).

The polypeptide can be used to kill coleopteran pests, especially by

corn polypetide environment. It is especially useful against southern

corn rootworm and western corn root worm, (Diabrotica undecimpunctate

chowardi Barbor, and Diabrotica virgifera vergifera LeConte respectively).

The mutant cry3Bb polynucleotides can also be used to produce transgenic
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Pred. No. 3.5e-276;
0; Mismatches 1;
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Best Local Similarity 99.8
Matches 651, Conservative
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AAY23192 standard, protein; 652 AA

RESULT 19 AAY23192 ID AAY2 XX

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Crylab mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Crylab mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Crylab. The B. thuringiensis Crylab oplypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified Crylab corresponding to from about amino acids 1-365 of the unmodified Crylab primary sequence (AAV232OT) represents the wild type Crylab protein). The polypeptide sequence (AAV232OT) represents the wild type Crylab protein) application to the environment. It is especially useful against southern con roctworm and western corn root worm, (Diabrotica undecimpunctata con roctworm and biabrotica virgifera vergifera undecimpunctata. The mutant crylab polymucleotides can also be used to produce transgenic plants with increased insecticide resistance
AAY23172-Y23206, and AAX23208-X23209 represent new Bacillus thuringiensis
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Best Local Similarity 99.5
Matches 649; Conservative
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Von Tersch MA,
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Score 3396; DB 2;
Pred. No. 5.1e-276;
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Von Tersch MA,
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MONSANTO CO
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                                                                                insecticidal activity; insecticidal specificity;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              ö
                                                                                             coleoptera; southern corn rootworm; western corn root worm; Diabrotica undecimpunctata howardi Barber; transgenic plant; Diabrotica virgifera vergifera LeConte; insecticide resistance.
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A, Romano C;
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Pred. No. 5.1e-276;
0; Mismatches 1;
                                                acid sequence of Cry3Bb.11226 polypeptide.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        Insecticidal Bacillus thuringiensis proteins.
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Von Tersch MA,
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97US-00993722.
97US-00993775.
97US-00996441.
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              (first entry)
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Best Local Similarity 99.8°
Matches 651; Conservative
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Slatin SL,
                                                                                                                                                                   Synthetic.
Bacillus thuringiensis.
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18-DEC-1997;
18-DEC-1997;
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Walters FS,
                                                                                                                                                                                                                                                                                            17-DEC-1998;
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              24-AUG-1999
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Cry3Bb; mutant; insecticidal activity; insecticidal specificity;
coleoptera; southern corn rootworm; western corn root worm;
Diabrotica undecimpunctata howardi Barber; transgenic plant;

Amino acid sequence of Cry3Bb.11237 polypeptide.

(first entry)

24-AUG-1999

Diabrotica virgifera vergifera LeConte; insecticide resistance.

Synthetic. Bacillus thuringiensis.

WO9931248-A1

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cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb colypeptide was modificat to have improved insecticidal activity or chanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified Cry3Bb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmodified Cry3Bb proteide sequence (AAY23207 represents the wild type Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cry3Bb polymucleotides can also be used to produce transgenic plants with increased insecticide resistance
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                                                                                                                                                                                                                                                                                                                                         Length 652;
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                                                                                                                                                                                                                                                                                                                                       99.7%; Score 3395; DB 2;
illarity 99.7%; Pred. No. 6.2e-276;
Conservative 2; Mismatches 0;
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                                                                                                                                                                                                                                                                                                        Sequence 652 AA;
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Kulesza CA;

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Bryson JW,

Malvar TM, Br Von Tersch MA,

Brussock SM, Slatin SL,

L, I

Walters

WPI; 1999-395184/33

ECOGEN INC. MONSANTO CO.

(ECOG-) (WONS) English

18-DEC-1997;

18-DEC-1997

97US-00993170. 97US-00993722. 97US-00993775. 97US-00996441.

98WO-US026852.

17-DEC-1998;

24-JUN-1999

18-DEC-1997 18-DEC-1997 Insecticidal Bacillus thuringiensis proteins.

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Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb polypeptide was modified to have improved insecticidal activity or chanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified Cry3Bb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmodified Cry3Bb polypeptide sequence (AAY232OT represents the wild type Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern or roctworm and western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cry3Bb polymucleotides can also be used to produce transgenic plants with increased insecticide resistance
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AAY23188 standard; protein; 652

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                                                                                                                                                                                                                                                                                                                                                                                  TVKDAVGTGISVVGQILGVVGVPFAGALTSFYQSFLNTIWPSDADPWKAFMAQVEVLIDK 120
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                                                                                                                                                                                                                                                           Length 652;
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Pred. No. 9.1e-276;
2; Mismatches 1;
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Best Local Similarity 99.5%;
Matches 649; Conservative
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A, Romano C;
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Von Tersch MA,
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97US-00993722.
97US-00993775.
97US-00996441.
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Slatin SL,
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MONSANTO CO
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18-DEC-1997;
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Walters FS,
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Von Tersch MA,
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Slatin SL,
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MONSANTO CO.
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified Cry3Bb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmodified Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corresponding mand western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cry3Bb polynucleotides can also be used to produce transgenic plants with increased insecticide resistance
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                                   insecticidal activity; insecticidal specificity;
                                                      coleoptera; southern corn rootworm; western corn root worm; Diabrotica undecimpunctata howardi Barber; transgenic plant; Diabrotica virgifera vergifera LeConte; insecticide resistance.
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Pred, No. 9.1e-276;
0; Mismatches 2;
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B, Romano (
 sequence of Cry3Bb.11084 polypeptide
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                                                                                                                                                                                                                                                                                                                                                                                                                                                      Malvar TM,
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97US-00993722.
97US-00993775.
97US-00996441.
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Matches 650; Conservative
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18-DEC-1997;
18-DEC-1997;
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Walters FS,
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acid
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Cry3Bb; mutant; insecticidal activity; insecticidal specificity;

Amino acid seguence of Cry3Bb.11235 polypeptide.

coleoptera; southern corn rootworm; western corn root worm; Diabrotica undecimpunctata howardi Barber; transgenic plant; Diabrotica virgifera vergifera LeConte; insecticide resistance.

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confication comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmedified cry3Bb modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmedified cry3Bb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmedified cry3Bb polypeptide sequence (AAY23207 represents the wild type Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cry3Bb polymucleotides can also be used to produce transgenic plants with increased insecticide resistance
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Pred. No. 1.1e-275;
2; Mismatches 1;
                                                                                                                                                                                                                                                                     99.64;
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Best Local Similarity 99.5
Matches 649; Conservative
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AAY23186 standard; protein; 652

(first entry)

24-AUG-1999

AAY23186;

RESULT 27
AAY23186
ID AAY2
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AC AAY2
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AAY23172-Y23206, and AAX23208-X23209 represent new Bacillus thuringiensis cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified Cry3Bb polypeptide, wherein the substitution or deletion cocurs at a position corresponding to from about amino acids 1-365 of the unmodified GAAY3207 represents the wild type Cry3Bb protein). The polypeptide sequence (AAX23207 represents the wild type Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cry3Bb polymucleotides can also be used to produce transgenic plants with increased insecticide resistance
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Von Tersch MA, Romano
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Pred. No. 1.1e-275;
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97US-00993722.
97US-00993775.
97US-00996441.
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Local Similarity 99.7%;
les 650; Conservative
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MONSANTO CO.
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18-DEC-1997;
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enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified CryBbb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmodified polypeptide sequence (AAY22307 represents the wild type CryBb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cryBb polynucleotides can also be used to produce transgenic plants with increased insecticide resistance
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                                                                                                                                                                                                                   99.5%; Score 3390; DB 2; 99.5%; Pred. No. 1.6e-275; ive 1; Mismatches 2;
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Best Local Similarity 99.5
Matches 649; Conservative
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Von Tersch MA,
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97US-00993775.
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Bacillus thuringiensis.
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AAY23172-Y23206, and AAX23208-X23209 represent new Bacillus thuringiensis Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The
                                                                                                                                  421 VTKVDFSQYDDQKNETSTQTYDSKRNNGHVSAQDSIDQLPPETTDEPLEKAYSHQLNYAE 480
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Diabrotica undecimpunctata howardi Barber, transgenic plant,
Diabrotica virgifera vergifera LeConte, insecticide resistance.
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Von Tersch MA,
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                     mutant; insecticidal activity; insecticidal specificity;
                                      coleoptera; southern corn rootworm; western corn root worm;
Diabrotica undecimpunctata howardi Barber; transgenic plant;
Diabrotica virgifera vergifera LeConte; insecticide resistance.
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                                                                                                                                                                                                                                                                                                                                                                                                                                      Malvar TM,
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97US-00993722.
97US-00993775.
97US-00996441.
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                                                                                                            Synthetic.
Bacillus thuringiensis
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MONSANTO CO
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Walters FS,
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.8-DEC-1997;
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mutant; insecticidal activity; insecticidal specificity;

coleoptera; southern corn rootworm; western corn root worm; Diabrotica undecimpunctata howardi Barber; transgenic plant; Diabrotica virgifera vergifera LeConte; insecticide resistance.

Synthetic. Bacillus thuringiensis

WO9931248-A1

24-JUN-1999

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modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified Cry3Bb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmodified polypeptide sequence (AAV21207 represents the wild type Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cry3Bb polymucleotides can also be used to produce transgenic plants with increased insecticide resistance
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                                                                                                                                                                                                                                      Score 3390; DB 2;
Pred. No. 1.6e-275;
2; Mismatches 1;
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Best Local Similarity 99.5%;
Matches 649; Conservative
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Kulesza CA;

Malvar TM, Bryson JW, Von Tersch MA, Romano C;

SM, Slatin SL,

Brussock

English L, Walters FS,

MONSANTO CO. ECOGEN INC

(SNOW)

(ECOG-)

97US-00993170. 97US-00993722. 97US-00993775. 97US-00996441.

18-DEC-1997; 18-DEC-1997;

98WO-US026852

17-DEC-1998;

8-DEC-1997; 18-DEC-1997; Insecticidal Bacillus thuringiensis proteins. Claim 39; Page 277-280; 512pp; English

WPI; 1999-395184/33.

AAY23172-Y23206, and AAX23208-X23209 represent new Bacillus thuringlensis cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified cry3Bb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmodified cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata corn rootworm and western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cry3Bb polymucleotides can also be used to produce transgenic plants with increased insecticide resistance TDHCVNWYNVGLNGLRGSTYDAWVKFNRFRREMTLTVLDLIVLFPFYDIRLYSKGVKTEL 300 61 TVKDAVGTGISVVGQILGVVGVPFAGALTSFYQSFLNTJWPSDADPWKAFMAQVEVLIDK 120 1 MIPINIRSEHDTIKVTPNSELQTNHNQYPLADNPNSTLEELNYKEFLRMTEDSSTEVLDNS TDHCVNWYNVGLNGLRGSTYDAWVKFNRFRREMTLTVLDLIVLFPFYDIRLYSKGVKTEL 1 MNPNNRSEHDTIKVTPNSELQTNHNQYPLADNPNSTLEELNYKEFLRMTEDSSTEVLDNS KIEEYAKSKALAELOGLONNFEDYVNALNSWKKTPLSLRSKRSQDRIRELFSQAESHFRN SMPSFAVSKFEVLFLPTYAQAANTHLLLLKDAQVFGEEWGYSSEDVAEFYHRQLKLTQQY SMPSFAVSKFEVLFLPTYAQAANTHLLLLKDAQVFGEEWGYSSEDVAEFLSRQLKLTQQY Gaps ö 99.5%; Score 3389; DB 2; Length 652; 99.7%; Pred. No. 2e-275; ive 0; Mismatches 2; Indels Matches 650; Conservative Similarity Sequence 652 AA; 121 181 241 61 121 181 241 Query Match Local g ò a g ò 엄 g à à ò

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9 9 240

120 180 180 240 300

Amino acid sequence of Cry3Bb.11222 polypeptide.

(first entry)

24-AUG-1999

AAY23173

AAY23173
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AC AAX2
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DT 24-P
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AAY23173 standard; protein; 652

RESULT 31

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Gaps

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180 179 240 239 300 299 360

359

420

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540 479

539 900 599

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61 TVKDAVGTGISVVGQILGVVGVPFAGALTSFYQSFLNTIMPSE-DPWKAFMAQVEVLIDK 119
deletion in the primary sequence of the native or unmodified Cry3Bb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1.365 of the unmodified polypeptide sequence (AAY23207 represents the wild type Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrocica undecimpunctata howardi Barber, and Diabrocica virgifera vergifera LeConte respectively). The mutant cry3Bb polynucleotides can also be used to produce transgenic plants with increased insecticide resistance
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                                                                                                                                                                                             Length
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                                                                                                                                                                                            Score 3387.5; DB 2;
Pred. No. 2.6e-275;
1; Mismatches 0;
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Best Local Similarity 99.7%;
Matches 650; Conservative
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                                                                                                                                                                Sequence 651 AA;
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                                SGNYVETRPSIGSSKTITSPFYGDKSTEPVQKLSFDGQKVYRTIANTDVAAMPNGKVYLG
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                                                                                                                                                                                                                                                                                                                           mutant; insecticidal activity; insecticidal specificity;
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Diabrotica undecimpunctata howardi Barber; transgenic plant;
Diabrotica virgifera vergifera LeConte; insecticide resistance.
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A, Romano (
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Von Tersch MA,
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MONSANTO CO
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Walters FS,
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   coleoptera; southern corn rootworm; western corn root worm;
Diabrotica undecimpunctata howardi Barber; transgenic plant;
Diabrotica virgifera vergifera LeConte; insecticide resistance.
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Pred. No. 2.9e-275;
2; Mismatches 2; Indels
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A, Romano C;
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Von Tersch MA,
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97US-00993722.
97US-00993775.
97US-00996441.
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Best Local Similarity 99.4%;
Matches 648; Conservative
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Slatin SL,
                                                                  Bacillus thuringiensis
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AAY23172-Y23206, and AAX23208-X23209 represent new Bacillus thuringiensis Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified Cry3Bb
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Diabrotica undecimpunctata howardi Barber; transgenic plant;
Diabrotica virgifera vergifera LeConte; insecticide resistance.
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Von Tersch MA, Romano
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Pred. No. 3.5e-275;
0; Mismatches 3;
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Best Local Similarity 99.5%;
Matches 649; Conservative
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AAY23172-Y23206, and AAX23208-X23209 represent new Bacillus thuringiensis Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified Cry3Bb polypeptide, wherein the substitution or deletion occurs at a position or corresponding to from about amino acids 1.365 of the unmodified cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern can roctworm and western corn root worm, (Diabrotica undecimpunctata howard! Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cry3Bb polymucleotides can also be used to produce transgenic
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Diabrotica undecimpunctata howardi Barber; transgenic plant,
Diabrotica virgifera vergifera LeConte; insecticide resistance
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Von Tersch MA, Romano C;
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Pred. No. 3.5e-275;
1; Mismatches 3;
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97US-00993722.
97US-00993775.
97US-00996441.
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Slatin SL,
                                                                                                                              Bacillus thuringiensis
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MONSANTO CO.
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corresponding to from about amino acids 1-365 of the unmodified polypeptide sequence (AAY33207 represents the wild type Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica vigilera vergifera LeConte respectively). The mutant cry3Bb polymucleotides can also be used to produce transgenic plants with increased insecticide resistance
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coleoptera; southern corn rootworm; western corn root worm;
Diabrotica undecimpunctata howardi Barber; transgenic plant;
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Pred. No. 4.3e-275;
1; Mismatches 3; Indels
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                                                                                                                                                VTKVDFSQYDDQKNETSTQTYDSKRNNGHVSAQDSIDQLPPETTDEPLEKAYSHQLNYAE
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                                                                                                                  VTKVDFSQYDDQKNETSTQTYDSKRNNGHVSAQDSIDQLPPETTDEPLEKAYSHQLNYAE
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A, Romano C
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Von Tersch MA,
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97US-00993722.
97US-00993775.
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Slatin SL,
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MONSANTO CO
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18-DEC-1997;
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AAY23172-Y23206, and AAX23208-X23209 represent new Bacillus thuringiensis Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified Cry3Bb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmodified
                                                                                                                                                                                                                                                                                         301 TRDIFTDPIFLLTTLQKYGPTFLSIENSIRKPHLFDYLQGIEFHTRLQPGYFGKDSFNYW 360
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                                   SGNYVETRPSIGSSKTITSPFYGDKSTEPVQKLSFDGQKVYRTIANTDVAAWPNGKVYLG
                                                     361 SGNYVETRPSIGSSKTITSPPYGDKSTEPVQKLSPDGQKVYRTIANTDVAAWPNGKVYLG
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Diabrotica undecimpunctata howardi Barber, transgenic plant;
Diabrotica virgifera vergifera LeConte; insecticide resistance.
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Bacillus thuringiensis.
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MONSANTO CO.
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Diabrotica virgifera vergifera LeConte; insecticide resistance
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Pred. No. 7.7e-275;
1; Mismatches 3; Indels (
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Von Tersch MA,
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Bacillus thuringiensis.
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                                                                                                                                                                                                                                                                                                       (ECOG-) ECOGEN INC. (MONS ) MONSANTO CO.
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polypeptide sequence (AAY23207 represents the wild type Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cry3Bb polynucleotides can also be used to produce transgenic plants with increased insecticide resistance
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                                                                                                                                                Length 652;
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                                                                                                                                              99.2%; Score 3380; DB 2; 99.4%; Pred. No. 1.1e-274; ive 0; Mismatches 4;
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Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B thuringiensis Cry3Bb polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified cry3Bb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmodified cry3Bb polypeptide sequence (AAY3207 represents the wild type Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. If is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata court cry3Bb polynucleotides can also be used to produce transgenic plants with increased insecticide resistance
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Pred. No. 1.1e-274;
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241 TDHCVNWYNVGLNGLRGSTYDAWVKFNRFRREMTLTVLDLIVLFPFYDVRLYPKGVKTEL 300
The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica virgifera vergifera LeConte respectively). The mutant cry3Bb polynucleotides can also be used to produce transgenic plants with increased insecticide resistance
                                                                                                                                                                                                                                                                                                                  181 SMPSFAVSKFEVLFLPTYAQAANTHLLLKDAQVFGEEWGYSSEDVAEFYHRQLKLTQQY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  361 SGNYVETRPSIGSSKTITSPFYGDKSTEPVQKLSFDGQKVYRTIANTDVAAWPNGKVYLG
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        481 CFLMQDRRGTIPFFTWTHRSVDFFNTIDAEKITQLPVVKAYALSSGASIIEGPGFTGGNL
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                                                                                                                                                                                                                                                                                                                                                                                                                    61 TVKDAVGTGISVVGQILGVVGVPFAGALTSFYQSFLNTIWPSDADPWKAFMAQVEVLIDK
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                                                                                                                                                                                                                         Length 652;
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                                                                                                                                                                                                                      99.2%; Score 3379; DB 2; llarity 99.1%; Pred. No. 1.4e-274; Conservative 2; Mismatches 4;
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Best Local Similarity
Matches 646; Conserv
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Von Tersch MA,
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18-DEC-1997;
18-DEC-1997;
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AAY21172-Y23206, and AAX22208-X23209 represent new Bacillus thuringiensis Cry3Bb mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Cry3Bb. The B. thuringiensis Cry3Bb polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified Cry3Bb polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-356 of the unmodified polypeptide sequence (AAY23207 represents the wild type Cry3Bb protein). The polypeptide can be used to kill coleopteran pests, especially by
                    SGNYVETRPSIGSSKTITSPFYGDKSTEPVQKLSFDGQKVYRTIANTDVAAWPNGKVYLG
                                                                                                                                                                                                                                                        SGNYVETRPSIGSSKTITSPFYGDKSTEPVQKLSFDGQKVYRTIANTDVAAWPNGKVYLG
                                                                           VTKVDFSQYDDQKNETSTQTYDSKRNNGHVSAQDSIDQLPPETTDEPLEKAYSHQLNYAE
                                                                                                      VTKVDFSQYDDQKNETSTQTYDSKRNNGHVSAQDSIDQLPPETTDEPLEKAYSHQLNYAE
                                                                                                                                                       CFLMQDRRGTIPFFTWTHRSVDFFNTIDAEKITQLPVVKAYALSSGASIIEGPGFTGGNL
                                                                                                                                                                                CFLMQDRRGTIPFFTWTHRSVDFFNTIDAEKITQLPVVKAYALSSGASIIEGPGFTGGNL
                                                                                                                                                                                                                                   LFLKESSNSIAKFKVTLNSAALLQRYRVRIRYASTTNLRLFVQNSNNDFLVIYINKTMNK
                                                                                                                                                                                                                                                                                                                   652
                                                                                                                                                                                                                                                                                                                                        DDDLTYQTFDLATTNSNMGFSGDKNELIIGAESFVSNEKIYIDKIEFIPVOL 652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              Cry3Bb; mutant; insecticidal activity; insecticidal specificity;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            coleoptera; southern corn rootworm; western corn root worm; Diabrotica undecimpunctata howardi Barber; transgenic plant; Diabrotica virgifera vergifera LeConte; insecticide resistance.
                                                                                                                                                                                                                                                                                                                 DDDLTYQTFDLATTNSNMGFSGDKNBLIIGAESFVSNEKIYIDKIEFIPVQL
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Von Tersch MA,
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97US-00993722.
97US-00993775.
97US-00996441.
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FS, Slatin SL,
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Bacillus thuringiensis.
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Von Tersch MA, Romano C;
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Pred. No. 2e-274;
0; Mismatches 4;
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97US-00993775.
97US-00996441.
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Slatin SL,
              Bacillus thuringiensis
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MONSANTO CO
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          corn rootworm and western corn root worm, (Diabrotica undecimpunctata howardi Barber, and Diabrotica virgifera vergifera LeConce respectively). The mutant cry3Bb polymucleotides can also be used to produce transgenic plants with increased insecticide resistance
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                                                                                     Score 3377; DB 2;
Pred. No. 2e-274;
1; Mismatches 3;
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Best Local Similarity 99.4%;
Matches 647; Conservative 1
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The present sequence is a Bacillus thuringiansis delta-endotoxin Cry3Bb variant AAV11231 which is toxic to Coleopteran insect pests. The coding sequence of this protein is used in an expression cassette that provides improved expression of Cry3B or Cry3B variant proteins in transgenic plants e.g. maize. Transgenic plants expressing higher levels of Cry3B proteins expressing higher levels of Cry3B proteins exhibit increased insecticidal activity against Coleopteran

Novel expression cassettes which express Bacillus thuringiensis Cry3 delta-endotoxin portion which is toxic to coleopteran insect pests, useful for producing transgenic plants with improved insecticidal

6; Page 106-108; 171pp; English

Claim

WPI; 2000-246568/21. N-PSDB; AAZ51638, AAZ51641, AAZ51642, AAZ51655, AAZ51656.

98US-0097150P

19-AUG-1998; 19-AUG-1999; 02-MAR-2000

WO200011185-A2

(MONS) MONSANTO CO

Romano CP;

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                                                                                                                                                                                                                     123 IEBYAKSKALABLIGGLIGNNFEDYVNALNSWKKTPLSLRSKRSIDRIRELFSIGAESHFRNS
                                                                                                                                                                                                                                                                    183 MPSFAVSKFEVLFLPTYAQAANTHLLLLKDAQVFGEEWGYSSEDVAEFYRRQLKLTQQYT
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                                                                                  NPNNRSEHDTIKVTPNSELQTNHNQYPLADNPNSTLEELNYKEFLRMTEDSSTEVLDNST
                                                                                                      NPNNRSEHDTIKVTPNSELQTNHNQYPLADNPNSTLBELNYKEFLRMTEDSSTEVLDNST
                                                                                                                                                                 63 VKDAVGTGISVVGQILGVVGVPFAGALTSFYQSFLNTIWPSDADPWKAFMAQVEVLIDKK
                                                                                                                                                                                                                                                      MPSFAVSKFEVL,FL,PTYAQAANTHLL,LLKDAQVFGEEWGYSSEDVAEFYHRQLKLTQQYT
                                                                                                                                                                                                                                                                                                            DHCVNWYNVGLNGLRGSTYDAWVKFNRFRREMTLTVLDLIVLFPFYDIRLYSKGVKTELT
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                           3; Length
                          Score 3377; DB 3;
Pred. No. 2e-274;
1; Mismatches 3;
                        Match 99.1%;
Local Similarity 99.4%;
les 647; Conservative
Sequence 653 AA;
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Bacillus thuringiensis

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                                                  602
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       Cry3Bbv11231; delta-endotoxin; plant; transgenic; insecticide; crystal 3; Cry3; Coleopteran insect infestation; increased toxicity; season long protection; beetle.
  601
                              FLKESSNSIAKFKVTLNSAALLQRYRVRIRYASTTNLRLFVQNSNNDFLVIVINKTMNKD
  FLKESSNSIAKFKVTLNSAALLQRYRVRIRYASTTNLRLFVQNSNNDFLVIYINKTMNKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               New modified polynucleotide useful for controlling Coleopteran insect infestation in a field of crop plants encodes insecticidal crystal 3 Bacillus thuringiensis delta-endotoxin.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 invention relates to a modified polynucleotide which encodes an
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                                                                                                       DDLTYQTFDLATTNSNMGFSGDKNELIIGAESFVSNEKIYIDKIEFIPVQL
                                                                                                                                     DDLTYQTFDLATTNSNMGFSGDKNELIIGAESFVSNEKIYIDKIEFIPVQL
                                                                                                                                                                                                                                                                                                                                                                                                                                                        Bacillus thuringiensis delta endotoxin Cry3Bbv11231
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                                                                                                                                                                                                                                                                                            ABU09195 standard; protein; 653 AA
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N-PSDB; ABX95182.
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                                                                                                                                                                                                              3 NPNNRSEHDTIKVTPNSELQTNHNQYPLADNPNSTLEELNYKEFLRMTEDSSTEVLDNST
                                                                                                                                                                                                                                                            122 IEEYAKSKALAELQGLQNNFEDYVNALNSWKKTPLSLRSKRSQDRIRELFSQAESHFRNS
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                                                                                                                             2 NPNNRSEHDTIKVTPNSELQTNHNQYPLADNPNSTLEELNYKEFLRMTEDSSTEVLDNST
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                                                                                            Gaps
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           652
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                                                               Length 653;
                                                                                              3; Indels
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                                                            Score 3377; DB 6;
Pred. No. 2e-274;
1; Mismatches 3
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                                                               99.1%;
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                                                                                              Conservative
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                                                                               Similarity
                              Sequence 653 AA;
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Cry3Bbv11231
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                                                             Query Match
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thuringiensis Cry3-delta-endotoxin gene or its variants having coloopteran inhibitory activity. The invention is useful for controlling Coleopteran innect infestation in a field of crop plants. The present sequence is B. thuringiensis Cry3Bb-delta- endotoxin variant protein
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           New transgenic plant resistant to Coleopteran pests, comprises Bacillus
thuringiensis Cry3-delta-endotoxin gene.
303 RDIFTDPIFLLTTLQXYGPTFLSIENSIRKPHLFDYLQGIEFHTRLQPGYFGKDSFNYWS
                                                                                                              363 GNYVETRPSIGSSKTITSPPYGDKSTEPVQKLSFDGQKVYRTIANTDVAAWPNGKVYLGV
                                                                                                                                                                                                                                423 TKVDFSQYDDQKNETSTQTYDSKRNNGHVSAQDSIDQLPPETTDEPLEKAYSHQLNYAEC
                                                                                                                                                                                                                                                                                                                                                                                                                                                           543 FLKESSNSIAKFKVTLNSAALLQRYRVRIRYASTTNLRLFVQNSNNDFLVIYINKTMNKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Transgenic plant; Cry3Bb-delta-endotoxin; Coleopteran pest resistance;
insecticide; variant.
                                                                                                                                                                                             422 TKVDFSQYDDQKNETSTQTYDSKRNNGHVSAQDSIDQLPPETTDEPLEKAYSHQLNYAEC
                                                                                                                                                                                                                                                                                                               482 FLMQDRRGTIPFFTWTHRSVDFFNTIDAEKITQLPVVKAYALSSGASIIEGPGFTGGNLL
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    DDLTYQTFDLATTNSNMGFSGDKNELIGAESFVSNEKIYIDKIEFIPVQL 652
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Pred. No. 2e-274;
1; Mismatches 3;
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Matches 647; Conservative
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              The invention relates to a modified polynucleotide which encodes an insecticidal crystal 3 (cry3) Bacillus thuringiensis delta-endotoxin such as Crybb. The modified polynucleotide is useful for producing a transformed cell, by introducing the modified polynucleotide into a cell modified polynucleotide into a microbial cell. The modified polynucleotide into a maize plant cell a metroducing a transformed maize plant cell and regenerating a maize plant by introducing the modified polynucleotide is useful for producing a maize plant cell. A transgenic plant expressing the modified polynucleotide is useful for controlling Coleopteran insect infestation in a field of crop plants. The modified polynucleotide is useful for crop plants expressing higher levels of the infect controlling B. thuringiensis delta-endotoxin. The modified polynucleotide is useful for controlling B. thuringiensis delta-endotoxin. The modified polynucleotide provides up to 10 fold higher levels of insect controlling B. thuringiensis delta-endotoxin. The modified controlling delta-endotoxin relative to the highest levels obtained using prior compositions. In particular, transgenic maize expressing higher levels of the Cry3Bb protein designed to exhibit increased toxicity toward conceptible target insect posts and season long protection from insect ensets that the modified polynucleotide. The minher of transcript the modified polynucleotide. The highest levels of transcript them endified polynucleotide. The highest levels of insect protection from insect purposed control of transcript that the modified polynucleotide. The highest levels of transcript them endified the modified polynucleotide. The highest highest levels that the modified polynucleotide. The highest 
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          polynucleotide reduces the number of transgenic events that have to be screened in order to identify one which contains beneficial levels of one or more insect controlling compositions. The present sequence represents the amino acid sequence of Bacillus thuringiensis delta endotoxin
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                                                                                                                                                                                                                                                                                                                             New modified polynucleotide useful for controlling Coleopteran insectinfestation in a field of crop plants encodes insecticidal crystal 3 Bacillus thuringiensis delta-endotoxin.
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Pred. No. 2e-274;
1; Mismatches 3; Indels
                                                                                                                                                                                                                                                                               N-PSDB; ABX95185, ABX95186, ABX95199, ABX95200
                                                                                                                                                                                                                                                                                                                                                                                                                                                     Disclosure; Col 101-104; 107pp; English.
                                                                                                                                      (MONS ) MONSANTO TECHNOLOGY LLC.
                                                                                 99US-00377466.
                             99US-00377466.
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Best Local Similarity 99.4%;
Matches 647; Conservative
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                             19-AUG-1999;
                                                                                 19-AUG-1999;
                                                                                                                                                                                                Romano CP;
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Crysub mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Crysub mutant proteins. The specification also describes methods of altering Bacillus thuringiensis Crysub. The B. thuringiensis Crysub polypeptide was modified to have improved insecticidal activity or enhanced insecticidal specificity against a target insect. The modification comprises at least one amino acid substitution, addition, or deletion in the primary sequence of the native or unmodified Crysub polypeptide, wherein the substitution or deletion occurs at a position corresponding to from about amino acids 1-365 of the unmodified Crysub polypeptide sequence (AAY23207 represents the wild type Crysub protein). The polypeptide can be used to kill coleopteran pests, especially by application to the environment. It is especially useful against southern corn rootworm and western corn root worm, (Diabrotica undecimpunctata corn tootworm and western corn root worm, (Diabrotica undecimpunctata corn crysub polypuncleotides can also be used to produce transgenic plants with increased insecticide resistance
                                                                                                                                                                                               thuringiensis
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                                                     Kulesza CA;
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                                                     Bryson JW,
                                                                  Romano
                                                                                                                                                                                              AAY23172-Y23206, and AAX23208-X23209 represent
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   99.1%; Score 3375; DB 2; 99.2%; Pred. No. 3e-274; ive 1; Mismatches 4
                                                                                                                              Insecticidal Bacillus thuringiensis proteins
                                                   Malvar TM, Br
                                                                                                                                                                Claim 39; Page 492-494; 512pp; English
                                                   SM,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Conservative
                                                                  Slatin SL,
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                    MONSANTO CO
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                                                                  63 VKDAVGTGISVVGQILGVVGVPFAGALTSFYQSFLNTIWPSDADPWKAFMAQVEVLIDKK
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VKDAVGTGISVVGQILGVVGVPFAGALTSFYQSFLNTIWPSDADPWKAFMAQVEVLIDKK
                                                                                                                 122 IEEYAKSKALAELQGLQNNFEDYVNALNSWKKTPLSLRSKRSQDRIRELFSQAESHFRNS
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                                                                                                                                                                                                                                                                                                                                                                                                                                       TKVDFSQYDDQKNETSTQTYDSKRNNGHVSAQDS1DQLPPETTDEPLEKAYSHQLNYAEC
                                                                                                                                                                                                                                                                                                                                                                                                                                                        TKVDFSQYDDQKNETSTQTYDSKRNNGHVSAQDSIDQLPPETTDEPLEKAYSHQLNYAEC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     PLIMODRRGTI PFFTWTHRSVDFFNTI DAEKITQL PVVKAYALSSGASI I EGPGFTGGNLL
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                                                                                                                                                                               MPSFAVSKFEVLFLPTYAQAANTHLLLLKDAQVFGEEWGYSSEDVAEFYHRQLKLTQQYT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Cry3Bb; mutant; insecticidal activity; insecticidal specificity;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         coleoptera; southern corn rootworm; western corn root worm;
Diabrotica undecimpunctata howardi Barber; transgenic plant;
Diabrotica virgifera vergifera LeConte; insecticide resistance.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 DDLTYQTFDLATTNSNMGFSGDKNELIIGAESFVSNEKIYIDKIEFIPVQL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             DDLTYQTFDLATTNSNMGFSGDKNELIIGAESFVSNEKIYIDKIEFIPVQL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Amino acid sequence of Cry3Bb.11098 polypeptide.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                standard; protein; 652
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97US-00993722.
97US-00993775.
97US-00996441.
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Bacillus thuringiensis.
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18-DEC-1997;
18-DEC-1997;
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                                                      DHCVNWINVGLNGLEGETYDAWVKFNRFRREMTLTVLDLIVLFPFYDIRLYSKGVKTELT
GNYVETRPSIGSSKTITSPFYGDKSTEPVQKLSFDGQKVYRTIANTDVAAWPNGKVYLGV
                                                                                                                                                                                                               423 TKVDFSQYDDQKNETSTQTYDSKRNNGHVSAQDSIDQLPPETTDEPLEKAYSHQLNYAEC
                                                                                                                                                                                                                                                                                                                    RDI FTDPI FSLNTLQEYGPT FLSI ENSI RKPHLFDYLQGI BFHTRLQPGY FGKDS FNYWS
                                                                                                                                             GNYVETRPSIGSSKTITSPFYGDKSTEPVØKLSFDGQKVYRTIANTDVAAWPNGKVYLGV
                                                                                                                                                                                                TKVDFSQYDDQKNETSTQTYDSKRNNGHVSAQDSIDQLPPETTDEPLEKAYSHQLNYAEC
                                                                                                                                                                                                                                                  FLMQDRRGTIPFFTWTHRSVDFFNTIDAEKITQLPVVKAYALSSGASIIEGPGFTGGNLL
                                                                                                                                                                                                                                                                    483 FLMQDRRGTIPFFTWTHRSVDFFNTIDAEKITQLPVVKAYALSSGASIIEGPGFTGGNLL
                                                                                                                                                                                                                                                                                                      PLKESSNSIAKPKVTLNSAALLQRYRVRIRYASTTNLRLFVQNSNNDFLVIYINKTMNKD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               New modified polynucleotide useful for controlling Coleopteran insect infestation in a field of crop plants encodes insecticidal crystal 3 Bacillus thuringiensis delta-endotoxin.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Cry3Bb 11231mv2; delta-endotoxin; plant; transgenic; insecticide; crystal 3; Cry3; Coleopteran insect infestation; increased toxicity; season long protection; beetle.
                                                                                                                                                                                                                                                                                                                                                       DDLTYQTFDLATTNSNMGFSGDKNELIIGAESFVSNEKIYIDKIEFIPVQL 652
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             Bacillus thuringiensis delta endotoxin Cry3Bb 11231mv2.
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 LFLKESSNSIAKFKVTLNSAALLQRYRVRIRYASTTNLRLFVQNSNNDFLVIYINKTMNK 600
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     182 MPSFAVSKFEVLFLPTYAQAANTHLLLLKDAQVFGEEWGYSSEDVAEFYHRQLKLTQQYT 241
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        The present sequence is a Bacillus thuringiensis delta-endotoxin Cry3Bb variant 11231mv2 which is toxic to Coleopteran insect pests. The coding sequence of this protein is used in an expression cassette that provides improved expression of Cry3B or Cry3B variant proteins in transgenic plants e.g. maize. Transgenic plants expressing higher levels of Cry3B proteins exhibit increased insecticidal activity against Coleopteran
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               61
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   NPNNRSEHDTIKVTPNSELQTWHNQYPLADNPNSTLEELNYKEPLRATEDSSTEVLDNST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 VKDAVGTGISVVGQILGVVGVPFAGALTSFYQSFLNTIWPSDADPWKAFMAQVEVLIDKK
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    I EEYAKSKALAELQGLQNNFEDYVNALNSWKKTPLSLRSKRSQDRIRELFSQAESHFRNS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             NPNNRSEHDTI KVTPNSELQTNHNQYPLADNPNSTLEELNYKEFLRMTEDSSTEVLDNST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Gaps
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                Novel expression cassettes which express Bacillus thuringlensis Cry3 delta-endotoxin portion which is toxic to coleopteran insect pests, useful for producing transgenic plants with improved insecticidal activity.
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                                                                                                                                                                                              Bacillus thuringiensis delta-endotoxin Cry3Bb variant 11231mv2.
                        Length 653;
                                                                                                                                                                                                                        delta-endotoxin; Cry3B; Bt toxin; crystal protein; insect insecticide; Coleopteran; expression cassette; transgenic
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Pred. No. 4.4e-274;
2; Mismatches 3;
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       N-PSDB; AAZ51640, AAZ51645, AAZ51646.
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                                                                                                                  standard; protein; 653
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                                                                                                                                                                      (first entry)
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Best Local Similarity 99.2
Matches 646; Conservative
                                                                                                                                                                                                                                                   Cry3Bb variant 11231mv2.
                                                                                                                                                                                                                                                                           Bacillus thuringiensis
                                                                                                                                                                                                                                                                                                                                                                                                                       (MONS ) MONSANTO CO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                           WPI; 2000-246568/21
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Sequence 653 AA;
                                                                                                                                                                                                                                                                                                                 WO200011185-A2
                                                                                                                                                                                                                                                                                                                                                                      19-AUG-1999;
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                                                                                                                                                                                                                                                                                          Synthetic.
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  541
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transformed cell, by introducing the modified polymucleotide into a cell such as a plant cell (preferably a maize cell) or a microbial cell. The modified polymucleotide is useful for producing a transformed maize plant by introducing the modified polymucleotide into a maize plant cell, selecting a transformed maize plant cell and regenerating a maize plant cell from the transformed maize plant cell and regenerating a maize plant cell modified polymucleotide is useful for controlling Coleopteran insect infestation in a field of crop plants. The modified polymucleotide is useful for controlling Coleopteran insect insect controlling B. thuringiensis delta-endotoxin. The modified polymucleotide provides up to 10 fold higher levels of insect controlling compositions. In particular, transgenic maize expressing higher levels of the CryBab protein designed to exhibit increased toxicity toward compositions. In particular, transgenic maize expressing higher levels of the cryBab protein designed to exhibit increased toxicity toward compositions in macticidally active protein. Improved control of the sesting and the insecticidally active protein. Improved control of susceptible target insect pests and season long protection from insect pathogens is achieved using the modified polymucleotide. The modified collecting the modified polymucleotide reduces the number of transgenic events that have to be servened in order to identify none which contains beneficial present of the contains beneficial protein. or more insect controlling compositions. The present sequence represents the amino acid sequence of Bacillus thuringiensis delta endotoxin Cry3Bb 88888888888888888888888888888888

Sequence 653 AA;

61 NPNNRSEHDTIKVTPNSELQTNHNQYPLADNPNSTLEELNYKEFLRMTEDSSTEVLDNST Gaps ; 0 Length 653; Indels 99.0%; Score 3373; DB 6; 99.2%; Pred. No. 4.4e-274; ive 2; Mismatches 3; Best Local Similarity 99.2 Matches 646; Conservative Query Match 0 ò

121 62 NPNNRSEHDTIKVTPNSELQTNHNQYPLADNPNSTLEELNYKEFLRMTEDSSTEVLDNST VKDAVGTG1SVVGQ11LGVVGVPFAGALTSFYQSFLNT1WPSDADPWKAFMAQVEVL1DKK 62

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63 VKDAVGTGISVVGQILGVVGVPFAGALTSFYQSFLNTIWPSDADPWKAFWAQVEVLIDKK 122 181 I EEYAKSKALAELQGLQNNFEDYVNALNSWKKTPLSLRSKRSQDRIRELFSQAESHFRNS 122

241

123 IEEYAKSKALAELQGLQNNFEDYVNALNSWKKTPLSLRSKRSQDRIRELFSQAESHFRNS 182

RDIFTDPIFSLNTLQEYGPTFLSIENSIRKPHLFDYLQGIEFHTRLQPGYFGKDSFNYWS 361 RDIFTDPIFLLTTLQKYGPTFLSIENSIRKPHLFDYLQGIEFHTRLRPGYFGKDSFNYWS 302 303

362 421 422 481 482 541 542 601 602

GNYVETRPSIGSSKTITSPFYGDKSTEPVQKLSFDGQKVYRTIANTDVAAWPNGKVYLGV GNYVETRPSIGSSKTITSPFYGDKSTEPVQKLSFDGQKVYRTIANTDVAAWPNGKVYLGV 362 363

FLMQDRRGTIPFFTWTHRSVDFFNTIDAEKITQLPVVKAYALSSGASIIEGPGFTGGNLL TKVDFSQYDDQKNETSTQTYDSKRNNGHVSAQDSIDQLPPETTDEPLEKAYSHQLNYAEC TKVDFSQYDDQKNETSTQTYDSKRNNGHVSAQDSIDQLPPETTDEPLEKAYSHQLNYAEC FLMQDRRGTIPFFTWTHRSVDFFNTIDAEKITQLPVVKAYALSSGASIIEGPGFTGGNLL 483 422 423 482

FLKESSNSIAKFKVTLNSAALLQRYRVRIRYASTTNIRLFVQNSNNDFLVIYINKTMNKD FLKESSNSIAKFKVTLNSAALLQRYRVRIRYASTTNLRLFVQNSNNDFLVIYINKTMNKD 542 543

DDLTYQTFDLATTNSNMGFSGDKNELIIGAESFVSNEKIYIDKIEFIPVQL 652

602

603 DDLTYQTFDLATTNSNMGFSGDKNELIIGAESFVSNEKIYIDKIEFIPVQL 653

ABU09202 standard; protein; 653 AA

ABU09202;

(first entry) 12-JUN-2003

Bacillus thuringiensis delta endotoxin Cry3Bb1 11231mv2.

Cry3Bb1 11231mv2, delta-endotoxin, plant, transgenic, insecticide, crystal 3; Cry3; Coleopteran insect infestation; increased toxicity; season long protection; beetle.

Bacillus thuringiensis. Synthetic.

US6501009-B1.

31-DEC-2002

99US-00377466. 19-AUG-1999; 99US-00377466. 19-AUG-1999; (MONS) MONSANTO TECHNOLOGY LLC.

Romano CP;

N-PSDB; ABX95189, ABX95190. WPI; 2003-352192/33

polynucleotide useful for controlling Coleopteran insect in a field of crop plants encodes insecticidal crystal 3 infestation in a field of crop plants e Bacillus thuringiensis delta-endotoxin. modified

Disclosure; Col 139-142; 107pp; English

The invention relates to a modified polynucleotide which encodes an insecticidal crystal 3 (Cry3) Bacillus thuringiensis delta-endotoxin such as CryBb. The modified polynucleotide is useful for producing a transformed cell, by introducing the modified polynucleotide into a cell such as a plant cell, printroducing the modified polynucleotide into a maize plant cell, introducing the modified polynucleotide into a maize plant cell, by introducing the modified polynucleotide into a maize plant cell, confirmed maize plant cell and regenerating a maize plant from the transformed maize plant cell and regenerating a maize plant from the transformed maize plant cell and regenerating a maize plant confirmed polynucleotide is useful for controlling Coleopteran insect infestation in a field of crop plants. The modified polynucleotide is useful for producing transgenic plants expressing higher levels of the insect controlling B. thuringiensis delta-endotoxin. The modified polynucleotide provides up to 10 fold higher levels of insect controlling compositions. In particular, transgenic maize expressing higher levels of the CryBbb protein designed to exhibit increased toxicity toward compositions. In particular, transgenic maize expressing higher levels of the CryBbb protein designed to exhibit increased toxicity toward compositions in particular, transgenic maize expressing higher levels of are resistant to the insecticidally active protein Improved control of succeptable target insects that are resistant to the insecticidally active protein Improved control of polynucleotide. The modified polynucleotide. The modified polynucleotide reduces the number of transgenic events that have to be identify one which contains beneficial levels of one or more insect controlling compositions. The present sequence represents the amino acid sequence of Bacillus thuringiensis delta endotoxin Cry3Bbl screened in order to

Ŗ Sequence 653 99.0%; Score 3373; DB 6; Length 653; 99.2%; Pred. No. 4.4e-274; Best Local Similarity Query Match

J.

Mismatches 3; Indels 0; Gaps 0;	NPNNRSEHDTIKVTPNSELGTNHNOYPLADNPNSTLEELNYKEFLRMTEDSSTEVLDNST 61 	SFYQSFLATIWPSDADPWKAFWAQVEVLIDKK 121 	IBĖYAKSKALAELOGLONNFEDYVNALNSWKKTPLSLRSKRSODRIRELFSQAESHFRNS 181 	MPSFAVSKFEVLFLPTYAQAANTHLLILKDAQVFGBEWGYSSEDVAEFYHRQLKLTQQYT 241 	DHCVNWYNVGLNGLRGSTYDAWVKFNRFRREMTLTVLDLIVLFPFYDIRLYSKGVKTELT 301 	RDIFTDPIFSLNTLQEYGPTFLSIENSIRKPHLFDYLQGIEFHTRLQPGYFGKDSFNYWS 361 	GNYVETRESIGSSKTITSPPYGDKSTEPVOKLSFDGOKVYRTIANTDVAAWPNGKVYLGV 421 	TKVDFSQYDDQKNETSTQTYDSKRNNGHVSAQDSIDQLPPETTDEPLEKAYSHQLNYAEC 481 	FLMODRRCTIPFFTWTHRSVDFFNTIDAEKITGLPVVKAYALSSGASIIEGPGFTGGNLL 541 	FLKESSNSIAKFKVTLNSAALLQRYRVRIRYASTTNIRLFVQNSNNDFLVIYINKTMVKD 601 	DDLTYQTFDLATTNSNMGFSGDRNELIIGAESFVSNEKIYIDKIEFIPVQL 652
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